

IN THE SPECIFICATION

Please amend the abstract, and paragraphs [001], [002], [004], [005], [006], [007], [008], [009], [013], [024] and [028] of the specification as shown below, in which deleted terms are indicated with strikethrough and/or double brackets, and added terms are indicated with underscoring.

[ABSTRACT]

An automobile door checker includes a check plate, a shoe holder housed in a case, a shoe that is held by the shoe holder and the shoe slides on the check plate accompanying relative movement between the case and the check plate, and a check spring that resiliently urges the shoe holder toward the check plate in order to press the shoe against the check plate. The shoe is axially supported in the shoe holder so that the shoe can swing from a neutral position to forward and backward swing limits. The shoe is provided with return-to-neutral means for exhibiting a return force that makes the shoe return to the neutral position. The contact area between the shoe and the check plate is arranged so that the frictional force in the contact area becomes the smallest when the shoe reaches the shoe swing limits.

[001] The present invention relates to an automobile door checker that is connected between a body and a door of an automobile and that controls the opening and closing torque of the door in order to maintain the door at a predetermined opening position and, in particular to an improvement of a door checker that includes a case secured to one of the body and the door of the automobile, a check plate that runs movably through the case and is connected to the other of the body and the door, a shoe holder that is held by the case and is able to move toward and away

from the check plate, a shoe that is held by the shoe holder and the shoe slides on the check plate accompanying relative movement between the case and the check plate, and a check spring that resiliently urges the shoe holder toward the check plate within the case in order to press the shoe against the check plate.

[002] Conventionally, in such a door checker, as disclosed in Japanese Patent Publication No. 3-13392, a detent notch, with which [[the]] a shoe engages, is formed on the check plate, and an engagement force between the detent notch and the shoe holds the door stationary at a defined degree of opening.

[004] It is conceivable that, by setting a large check spring load so as to increase the frictional force between the shoe and the check plate and not providing a detent notch in the check plate, the door could be held stationary at any degree of opening. However, in such an arrangement, the operating load during opening and closing of the door also increases, and opening and closing operations of the door cannot be carried out lightly easily, without overcoming the frictional force of the large check spring.

[005] The present invention has been achieved under the above-mentioned circumstances, and it is an object thereof to provide an automobile door checker that can reliably hold a door stationary at any degree of opening, and allows the door to be opened and closed lightly easily, by decreasing the operating load when opening and closing of the door is started.

[006] In order to achieve this object, in accordance with a first aspect of the present invention, there is proposed provided an automobile door checker that includes a case secured to one of a body and a door of an automobile, a check plate that runs movably through the case and is linked to the other of the body and the door, a shoe holder that is held by the case and is able to move toward and away from the check plate, a shoe that is held by the shoe holder and the shoe slides on the check plate accompanying relative movement between the case and the check plate, and a check spring that resiliently urges the shoe holder toward the check plate within the case in order to press the shoe against the check plate, wherein the shoe is axially supported in the shoe holder so that the shoe can swing from a neutral position to forward and backward swing limits along the lengthwise direction of the check plate, wherein return-to-neutral means for exhibiting a return force that makes the shoe return to the neutral position is connected to the shoe, and wherein the contact area between the shoe and the check plate is arranged so that the frictional force in the contact area becomes the smallest when the shoe reaches the shoe swing limits compared to that of when the shoe is operated within the swing limits.

[007] In accordance with this first aspect, when the door is in a load-free state at a given degree of opening, the shoe is held at the neutral position by the action of the return-to-neutral means, and a large frictional force is generated in the contact area between the shoe and the check plate, thereby enabling the door to be held stationary at the given degree of opening. Furthermore, when an operating force having a certain value or more is applied to the door in the opening or closing direction, the shoe is swung to the swing limit or the vicinity thereof, thus reducing the frictional force in the contact area between the shoe and the check plate, so that the shoe can slide smoothly over the check plate, and the door can be opened and closed lightly easily.

[008] Furthermore, in accordance with a second aspect of the present invention, in addition to the first aspect, there is proposed provided an automobile door checker wherein having a the return-to-neutral means which includes a recess formed in the shoe, an engagement member that engages with the recess, and a return spring for urging the engagement member in a direction in which the engagement member engages with the recess, the recess having an inclined face that, accompanying swinging of the shoe from the neutral position toward the swing limits, pushes the engagement member upward in order to generate the return force by increasing the repulsive force of the return spring.

[009] In accordance with this second aspect, a required return-to-neutral force for the shoe can be obtained easily by adjustably setting the angle of the inclined face of the recess.

[013] As shown in FIG. 2 and FIG. 3, the door checker C has a case 1 secured to an inner face of an end wall of the door D by bolts 2. This case 1 is formed from a case main body 1a having a box shape with one end thereof open, and a cover 1b covering the open end and secured to the end wall of the door D by the bolts 2. Through holes 4 and 5 are bored in the cover 1b and the case main body 1a, and arranged coaxially with a through hole 3 that opens in the end wall of the door D. A bracket 7 and the base end of a check plate 6 running through these three through holes 3, 4, and 5 are pivotably connected to each other via a pivot 8. This bracket 7 is secured to the body [[D]] B by a bolt 9 with the pivot 8 parallel to the pivot axis of the hinge H. In this arrangement, a sealing plate 10 for sealing a gap between the through hole 3 and the check plate 6 is disposed between the cover 1b and the end wall of the door D.

[024] When the door D is at a given intermediate degree of opening in a no-load state, as shown in FIG. 6, the shoe 20 is maintained at the neutral position N by the engagement member 24 of the return-to-neutral means 32 being pressed against the two opposing inclined faces 28a of the recess 28 of the shoe 20 by virtue of the urging force of the return spring 31. Since this shoe 20 presses the high frictional coefficient surface 27a against the check plate 6 by means of the urging force of the check spring 22, a large frictional force is generated between the shoe 20 and the check plate 6, and the door D can be held stationary at the above any degree of opening by means of the frictional force.

[028] Subsequently, increasing the operating force to open or close the door D allows the face of the shoe 20 that is in contact with the check plate 6 to move from the first segment S1 to the second segment S2 as shown in FIG. 8, the low frictional coefficient surface 27b of the shoe 20 makes contact with the check plate 6, the frictional force therebetween rapidly decreases, the shoe 20 stops pivoting around the pivot 25 and starts slipping on the check plate 6, and as a result the door D can be opened or closed relatively lightly easily.